

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P-2002-025WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK 03/00834	International filing date (day/month/year) 18.12.2003	Priority date (day/month/year) 20.12.2002
International Patent Classification (IPC) or both national classification and IPC H04R25/00		
Applicant OTICON A/S ET AL.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I Basis of the opinion
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 23.06.2004	Date of completion of this report 14.09.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Baumann, M Telephone No. +49 89 2399-2447



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK 03/00834

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-7 as originally filed

Claims, Numbers

1-7 as originally filed

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
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International application No. PCT/DK 03/00834

Prior Art

Reference is made to the following documents:

D1: WO 01/97558 A. D4: EP-A-1 017 253.
D2: WO 00/65873 A. D5: US-A-4 773 095.
D3: WO 01/95666 A.

Re Item V (novelty, inventive step, industrial applicability)

1. **Technical field:** Hearing aid with adaptive directional response & method for adjusting the response.

The closest prior art document D1 relates to an adaptive-directionality microphone system, such as used in hearing aids. More specifically, D1 discloses an adaptive directional system comprising two fixed polar pattern units, ie. a fixed rear-null polar pattern unit producing an enhanced speech signal value, and a fixed front-null pattern unit producing an enhanced noise signal value. In order to improve the signal-to-noise ratio, the system is adapted to adaptively filter the enhanced noise signal value and to combine it with the enhanced speech signal value to produce the output of the microphone system.

The subject-matter of claim 1 differs from D1 in that the microphone system of the hearing aid is adapted to take into account the influence of an object being placed near or at the microphone system. In other words, the system of D1 is not designed for adapting the fixed forward and fixed backward pointing directivity patterns to the presence of an object near or at the microphone system.

The apparatus of **claim 1** provides an improved noise suppression when unwanted signals are coming from the shadow side of an object, ie. the hearing aid user's head, by mixing the fixed forward and backward directivity patterns at a ratio which ensures energy minimization of the output signal under prevailing acoustic conditions.

These features are neither known nor suggested by the documents D1-D5 cited in the international search report.

D2 relates to a multi-microphone system for use with a hearing aid. The system has no adaptive directional algorithm wherein fixed forward and backward pointing directivity patterns are generated and mixed as claimed. None of the documents D3-D5 shows nor suggests the related adaptive directional system as claimed.

Claim 1 therefore is novel and involves an inventive step in the sense of Article 33(2) and (3) PCT.

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Independent method **claim 5** relates to a method for adjusting the directional response of a microphone system which is to function at or near an object. The method comprises a step for adjusting the response from the microphone system so that the highest possible ratio between the sound signal coming from the preferred direction and unwanted sound signals coming from other directions is obtained. The adjusting is carried out for a number of different frequencies. None of the documents D1-D5 cited in the international search report shows nor suggest the method as claimed. The subject-matter of claim 5 is therefore also novel and inventive in the sense of Article 33(2) and (3) PCT.

2. **Claims 2-4 and 6-7 are dependent on claims 1 and 5, respectively,** and as such also meet the requirements of the PCT with respect to novelty and inventive step (Article 33(2) and (3) PCT).
3. The application as defined in claims 1 to 7 is doubtless industrially applicable (Article 33(4) PCT).